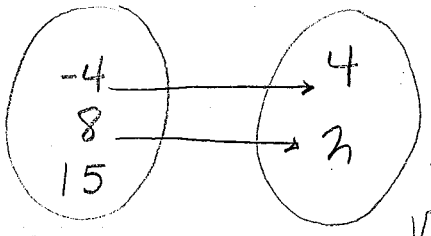
WS# 33 – Answer Key

1. A. $d = \{-2, -1, 3, 10\}$
$r = \{4, 6, 7, 8\}$
B. one to one, x and y values different
C. yes, the function is one to one

2. 

A. $d: \{-4, 8, 15\}$
$r: \{4, 2\}$
B. relation, x value doesn't have a y.
C. no, the function is not one to one.

$\sqrt{-3}$

3. A. $d: (-\infty, \infty)$ $r: (-\infty, \infty)$
B. one to one, passes VLT and HLT
C. yes, the function is one to one

4. A. $d: (-\infty, -1] \cup [1, \infty)$ $r: (-\infty, \infty)$
B. relation, fails VLT
C. no, the function is not one to one

5. A. $d: (-\infty, \infty)$ $r: [3, \infty)$
B. function, passes VLT
C. no, the function is not one to one

6. A. $d: [-8, -4]$ $r: [0, 2]$
B. function, passes VLT
C. no, the function is not one to one.

7. A. $3(-3) - 7 = \boxed{-16}$

B. $(x+2)^2 - 4(x+2) + 2$
$(x+2)(x+2) - 4x - 8 + 2$
$x^2 + 2x + 2x + 4 - 4x - 6$
$= \boxed{x^2 - 2}$

C. $(f \circ g)(2)$
$3(2) - 7 = -1$
$(-1)^2 - 4(-1) + 2$
$= \boxed{7}$

D. $(f \circ g)(x)$
$3x - 7$
$(3x-7)^2 - 4(3x-7) + 2$
$(3x-7)(3x-7) - 12x + 28 + 2$
$9x^2 - 21x - 21x + 49 - 12x + 30$
$\boxed{9x^2 - 54x + 79}$

E. $(g \circ g)(x)$
$3x - 7$
$= 3(3x-7) - 7$
$= 9x - 21 - 7$
$= \boxed{9x - 28}$

F. $3x - 7 = 38$
$+7 \quad +7$
$\frac{3x}{3} = \frac{45}{3}$
$\boxed{x = 15}$

G. $x^2 - 4x + 2 = 3x - 8$
$-3x + 8 \quad -3x + 8$
$x^2 - 7x + 10 = 0$
$(x-5)(x-2) = 0$
$\boxed{x = 5} \quad \boxed{x = 2}$

8. A. $\sqrt{4(5)+20}$
$\sqrt{40} = \sqrt{4\cdot 10}$
$= \boxed{2\sqrt{10}}$

B. $\sqrt{4(-7)+20}$
$\sqrt{-8} = \sqrt{4\cdot 2\cdot -1}$
$= \boxed{2i\sqrt{2}}$

C. $(\sqrt{4x+20})^2 = (x+2)^2$
$4x+20 = (x+2)(x+2)$
$4x+20 = x^2+2x+2x+4$
$4x+20 = x^2+4x+4$
$-4x-20 \quad -4x-20$
$0 = x^2-16$
$0 = (x+4)(x-4)$
$\boxed{x=-4 \mid x=4}$

D. $(i)^2+4(i)+12$
$-1+4i+12$
$\boxed{11+4i}$

E. $(7-x)^2+4(7-x)+12$
$(7-x)(7-x)+28-4x+12$
$49-7x-7x+x^2-4x+40$
$= \boxed{x^2-18x+89}$

F. $(2x+12)^2+4(2x+12)+12$
$(2x+12)(2x+12)+8x+48+12$
$4x^2+24x+24x+144+8x+60$
$= \boxed{4x^2+56x+204}$

G. $x^2+4x+12 = 3x+32$
$-3x-32 \quad -3x-32$
$x^2+1x-20 = 0$
$(x+5)(x-4) = 0$
$\boxed{x=-5 \mid x=4}$

9. A. $d: (-\infty, \infty)$ $r: (-\infty, \infty)$
B. $(0,-5)$
C. $x=-3,-1,2$
D. $x\to-\infty, f(x)\to-\infty$
$x\to+\infty, f(x)\to+\infty$
E. $(-2,4)$ $(1,-8)$
F. 3 pts.
G. $(-\infty,-2)\cup(1,\infty)$
H. $-2<x<1$
I. $(-3,-1)\cup(2,\infty)$
J. $x\le -3$ or $-1\le x\le 2$

10. A. on graph
B. $d: [-3,\infty)$ $r: (-\infty,4]$
C. 4
D. yes, inv. passes VLT

11. A. $x=-1,7$
B. $(0,-2)$
C. $-4<x<5$
D. $(-1,7)$

12. A. $d: (-\infty,\infty)$ $r: (-\infty,\infty)$
B. $(0,12)$
C. 2, $x=-2,6$
D. $x\to-\infty, f(x)\to-\infty$
$x\to+\infty, f(x)\to+\infty$
E. 2, $(1,75)$, $(6,0)$
F. $(-\infty,1)\cup(6,\infty)$
G. $1<x<6$
H. $(-\infty,2]$
I. $x>-2$
J. 3

12K. $-16x^2 = x^3 - 10x^2 + 12x + 72$

$+16x^2 \quad +16x^2$

$0 = x^3 + 6x^2 + 12x + 72$

Group

$0 = x^2(x+6) + 12(x+6)$

$0 = (x^2+12)(x+6)$

$\sqrt{x^2} = \sqrt{-12}$ | $x = -6$

$x = \sqrt{4 \cdot 3 \cdot -1}$

$x = 2i\sqrt{3}$

13. $\frac{x}{1} = \frac{5y-7}{y+2}$

$xy + 2x = 5y - 7$

$-5y - 2x \quad -5y - 2x$

$xy - 5y = -7 - 2x$

$\frac{y(x-5)}{x-5} = \frac{-7-2x}{x-5}$

$y = \frac{-7-2x}{x-5}$ yes, passes VLT

14. $x = (y-1)^2 + 2$

$-2 \quad -2$

$\sqrt{x-2} = \sqrt{(y-1)^2}$

$\pm\sqrt{x-2} = y - 1$

$+1 \quad +1$

$1 \pm \sqrt{x-2} = y$ no, fails VLT

15. $(x)^2 = (\sqrt{y+8})^2$

$x^2 = y + 8$

$-8 \quad -8$

$x^2 - 8 = y$ yes, passes VLT

16. $\frac{x}{1} = \frac{2y-1}{y+3}$

$xy + 3x = 2y - 1$

$-2y - 3x \quad -2y - 3x$

$xy - 2y = -1 - 3x$

$\frac{y(x-2)}{x-2} = \frac{-1-3x}{x-2}$

$y = \frac{-1-3x}{x-2}$ yes, passes VLT

17. $x = 6y^2 + 8$

$-8 \quad -8$

$\frac{x-8}{6} = \frac{6y^2}{6}$

$\sqrt{\frac{x-8}{6}} = \sqrt{y^2}$

$\pm\sqrt{\frac{x-8}{6}} = y$ no, fails VLT

18. $x = (y+4)^2 - 3$

$+3 \quad +3$

$\sqrt{x+3} = \sqrt{(y+4)^2}$

$\pm\sqrt{x+3} = y + 4$

$-4 \quad -4$

$-4 \pm \sqrt{x+3} = y$

no, fails VLT

19. $\frac{x}{1} = \frac{4y+1}{3y-7}$

$3xy - 7x = 4y + 1$

$-4y + 7x \quad -4y + 7x$

$3xy - 4y = 1 + 7x$

$\frac{y(3x-4)}{3x-4} = \frac{1+7x}{3x-4}$

$y = \frac{1+7x}{3x-4}$ yes, passes VLT

20. $\frac{x}{1} = \frac{-7+y}{3y-1}$

$3xy - x = -7 + y$

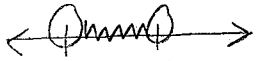
$-y + x \quad +x - y$

$3xy - y = -7 + x$

$\frac{y(3x-1)}{3x-1} = \frac{-7+x}{3x-1}$

$y = \frac{-7+x}{3x-1}$ yes, passes VLT

21. $x^2 - 9 < 16$
$-16 \quad -16$
$x^2 - 25 < 0$
$(x+5)(x-5) = 0$
$x = -5 \mid x = 5$



$(-5, 5)$
$-5 < x < 5$

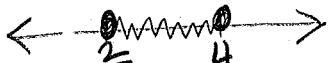
22. $x^2 + 4x \geq 0$
$x(x+4) = 0$
$x = 0 \mid x = -4$

$(-\infty, -4] \cup [0, \infty)$
$x \leq -4$ or $x \geq 0$

23. $x^2 + 8x > -2x - 16$
$+2x + 16 \quad +2x + 16$
$x^2 + 10x + 16 > 0$
$(x+8)(x+2) = 0$
$x = -8 \mid x = -2$

$(-\infty, -8) \cup (-2, \infty)$
$x < -8$ or $x > -2$

24. $3x^2 - 4x \leq 6x + 8$
$-6x - 8 \quad -6x - 8$
$3x^2 - 10x - 8 \leq 0$
$(3x - 12)(3x + 2) = 0$
$3(x-4)(3x+2) = 0$
$x = 4 \mid x = -\frac{2}{3}$



$\left[-\frac{2}{3}, 4\right]$
$-\frac{2}{3} \leq x \leq 4$

25. $(x - 12y)(x - 2y)$

26. $(x^2 - 4)(x^2 + 1)$
$(x+2)(x-2)(x^2+1)$

27. $x^3(x-4) - 9x(x-4)$
$(x^3 - 9x)(x-4)$
$x(x^2 - 9)(x-4)$
$x(x+3)(x-3)(x-4)$

28. $(7x-7)(7x-4)$
$7(x-1)(7x-4)$

29. $4x^2(x^2 - 1)$
$4x^2(x+1)(x-1)$

30. $2(3x^2 - 13x - 10)$ $\times 30$
$2(3x - 15)(3x + 2)$
$2 \cdot 3(x-5)(3x+2)$
$2(x-5)(3x+2)$

Name: _____ Date: _____ Calc. # _____

Unit 2 Review WS #33 Period: _____

For problems 1 - 6:

A) State the domain and range of the relation, in interval notation where appropriate.

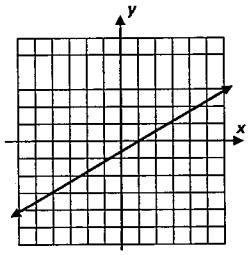
B) Is it a relation, function or one to one function? Explain.

C) Is its inverse a function? Explain.

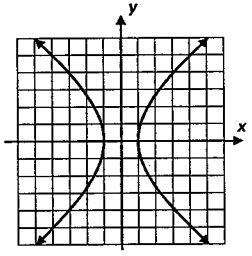
1) $f(x)=\{(-1,4),(3,6),(-2,7),(10,8)\}$

2) Given the domain {-4, 8, 15}. Draw and arrow diagram using the rule $f(x)=\sqrt{12-x}$, with the range including real numbers.

3)



4)



5) $f(x)=(x-2)^2+3$

6) $f(x)=\sqrt{4-(x+6)^2}$

7) If $f(x) = x^2 - 4x + 2$ and $g(x) = 3x - 7$, find the following:

A) g(-3) B) f(x + 2) C) (f o g)(2)

D) (f o g)(x) E) (g(g(x)) F) g(x) = 38

G) f(x) = 3x – 8

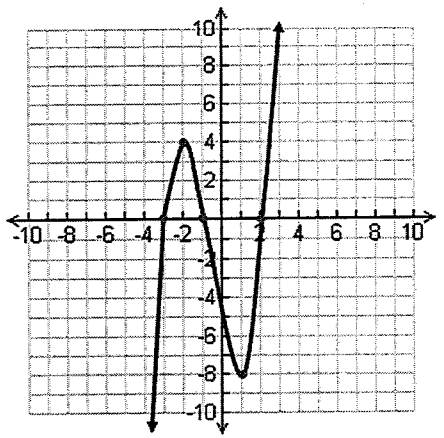
8) Given the function $h(x)=\sqrt{4x+20}$ and $k(x)=x^2+4x+12$, find:

A) $h(5)$ B) $h(-7)$ C) $h(x)=x+2$

D) $k(i)$ E) $k(7-x)$ F) $k(2x+12)$

G) $k(x)=3x+32$

9) The function $g(x)$ is shown.



A) State the domain and range of $g(x)$ in interval notation.

B) State the *y*-intercept of the function.

C) State the *zeroes* of the function.

D) State the end behavior.

E) State the turning point(s).

F) How many values solve the equation $g(x)=-4$? Circle the points on the graph to justify your solution.

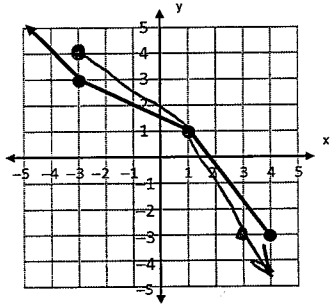
G) Write in interval notation where $g(x)$ is increasing.

H) Write in set notation where $g(x)$ is decreasing.

I) Write in interval notation where $g(x)>0$.

J) Write in set notation where $g(x)\leq 0$.

10) Given the function $h(x)$ shown.



A) Graph the function's inverse, $h^{-1}(x)$.

B) State the domain and range of $h^{-1}(x)$.

C) What is the value of $h^{-1}(-3)$?

D) Is the inverse a function? Explain.

11) A continuous function $f(x)$ has a domain of $-7 \le x \le 10$ and has selected values shown in the table below. The function a turning point at $(-4,12)$ and $(5,-6)$.

x	-7	-4	-1	0	2	5	7	10
$f(x)$	8	12	0	-2	-5	-6	0	4

A) State the zeroes of the function.

B) State the y-intercept of the function.

C) State the interval over which $f(x)$ decreasing, in set notation.

D) State the interval over which $f(x) < 0$, in interval notation.

12) Given the function $f(x) = x^3 - 10x^2 + 12x + 72$.

A) State the domain and range of the function, in interval and set notation.

B) State the *y*-intercept of the function.

C) How many roots does the function have? State the roots.

D) Describe the end behavior of the graph, in interval notation.

E) How many turning points does $f(x)$ have? State the turning points.

F) State the interval(s) where $f(x)$ is increasing. Write in interval notation.

G) State the interval(s) in which $f(x)$ is decreasing. Write in set notation.

H) State the interval(s) where $f(x) \le 0$. Write in interval notation.

I) State the interval(s) in which $f(x) > 0$. Write in set notation.

J) How many values solve $f(x) = 24$?

K) Find $f(x) = -16x^2$

Solve *algebraically* for the inverse function using the inverse function notation $f^{-1}(x)$. Is the inverse a function? Explain.

13) $f(x) = \dfrac{5x-7}{x+2}$

14) $f(x) = (x-1)^2 + 2$

15) $f(x) = \sqrt{x+8}$

16) $f(x) = \dfrac{2x-1}{x+3}$

17) $f(x) = 6x^2 + 8$

18) $f(x) = (x+4)^2 - 3$

19) $f(x) = \dfrac{4x+1}{3x-7}$

20) $f(x) = \dfrac{-7+x}{3x-1}$

From the beginning of the year! Still on this test.

Solve the following inequalities algebraically. Express the solution on a number line, interval notation and set notation.

21) $x^2 - 9 < 16$

22) $x^2 + 4x \ge 0$

23) $x^2 + 8x > -2(x+8)$

24) $3x^2 - 4x \le 6x + 8$

Factor the following completely:

25) $x^2 - 14xy + 24y^2$

26) $x^4 - 3x^2 - 4$

27) $x^4 - 4x^3 - 9x^2 + 36x$

28) $7x^2 - 11x + 4$

29) $4x^4 - 4x^2$

30) $6x^2 - 26x - 20$